

Written Statement for the Record Committee on Ways and Means, Social Security Subcommittee United States House of Representatives

For a Hearing on: Improper Payments in Social Security Disability Programs Held on February 26, 2014

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Chairman Johnson, Ranking Member Becerra, and Members of the Subcommittee:

Than you for the opportunity to provide IBM's comments on how the Social Security Administration (SSA) can reduce improper payments and improve operations of SSA disability programs.

1 Introduction

Over the past 75 years, IBM has worked as a trusted partner with SSA in implementing many generations of leading-edge technology. From the new IBM Type 77 Collators (developed by IBM specifically for the new Social Security Board) in the 1930s, through SSA's first electronic computing device (the IBM 604 Electronic Calculator) and first large-scale computer (the IBM 705) in the 1950s, and SSA's workhorse case processing system (the IBM AS400/Content Manager) in the 1990s, all the way up to the first uses of modern analytics and predictive modeling after the turn of the 21st century (the Quick Disability Determination [QDD] and Compassionate Allowances [CAL] projects), SSA has turned to IBM for innovative solutions in its most difficult challenges.

IBM encourages greater emphasis, focused funding, and accelerated information technology (IT) and systems modernization through greater use of analytics. By employing "scoring engines" and other data analytics, like those developed for QDD and CAL, the quality, speed, and accuracy Social Security Disability Insurance (SSDI) and Supplemental Security Incomes (SSI) decisions and claims review can be greatly improved. Analytics tools will also help identify improper payments, and patterns of fraud and abuse, to alert investigators and provide deterrence.

Over the last six months, IBM has engaged with SSA technology staff and thought leaders on the most effective use of predictive analytics for detection of disability improper payments and cognitive computing, such as modifying, for disability examiners and ALJs, IBM's Watson decision support system. Engagements have included:

- Sponsoring an industry briefing in August 2013 at SSA Woodlawn,
- After extensive discussion with SSA thought leaders, submitting a proposal to establish an SSA/industry/academic Virtual Center for Program Integrity, and
- In coordination with the new SSA Deputy CIO, developing an advanced technology workshop for SSA technology and program staff, including a view of SSA operations in 2030 that includes cognitive computing.

IT-enabled Analytics

The disability determination process can be long and difficult. Complex eligibility rules and many layers of review with multiple handoffs make the disability programs costly to implement and difficult to manage.

According to recent Congressional hearings, including this hearing, inconsistencies in decision outcomes erode public faith in the programs. Improving program consistency, speed, and accuracy will reserve limited funds for those applicants most in need.

Data Predictive Modeling

Creating a **predictive modeling system** to support the SSA disability decision process at the Examiner and Administrative Law Judge (ALJ) levels would:

- 1. Allow SSA to analyze the data from decisions made by Examiners and ALJs;
- 2. Provide a foundation of institutional knowledge across all offices, states, and regions;
- 3. Significantly improve Examiner and ALJ decision quality and consistency; and
- 4. Predict fraud and eligibility, and the value of streamlined process improvements.

SSA could benefit from the experience of the Center for Medicare and Medicaid Services (CMS) in standing up its Center for Program Integrity (CPI) Fraud Prevention System (FPS), which, during Fiscal Year (FY) 2012, its first year of operation, prevented, or identified for follow-up, \$115.4 million in improper payments through the use of predictive modeling analysis. The FPS is an increasingly effective primary tool of CMS CPI as part of the Health Care Fraud and Abuse Control (HCFAC) program. HCFAC resulted in recovery of \$4.2 billion in FY2012.

Predictive modeling can improve today's Examiner and ALJ decisions. However, the larger challenge of overhauling the examiner and ALJ systems can be accomplished through the use of a cognitive computing system, which would transform the entire SSA disability determination process by increasing accuracy, consistency, and speed, and saving billions of dollars over time.

WatsonTM Decision Support in Disability Determination

Today, one of SSA's biggest challenges is its disability claims processing systems, a challenge reflected clearly in the Agency Strategic Plan, Strategic Goal #1, to Deliver Quality Disability Decisions and Services. Addressing this goal, SSA intends to reduce waiting time for decisions and reduce case backlogs, improve disability policies, procedures, and tools, and expedite cases for the most severely disabled. (See Agency Strategic Plan, Securing Value for America, Fiscal Years 2013-2016, Social Security Administration. http://www.socialsecurity.gov/asp/plan-2013-2016.pdf) IBM is ready to help SSA achieve this strategic goal by deploying the newest and most innovative tools available.

IBM® Watson™ is IBM's leading-edge technology that has been successfully adapted to address important business issues in many industries, including medicine and healthcare. Although Watson™ initially made a name for itself by defeating the top Jeopardy! Champions on television, this technology has been further refined and improved, resulting in its deployment in a wide variety of more practical uses. Watson™ has addressed the challenges of cancer diagnosis and treatment at Memorial Sloan Kettering Cancer Center, Cleveland Clinic, and at the M.D. Anderson Cancer Center, and improved utilization management at WellPoint. These, and other current uses, are described in more detail in Section 4. Given the strong similarities between the SSA disability decision process and the processes (such as medical diagnosis) that Watson™ addresses now in the real world, IBM strongly believes that Watson™ can address current issues with the SSA disability determination process to improve the consistency, accuracy, and speed of its disability determinations. IBM® Watson™ represents an initial step into a new era of cognitive computing. Examples of the revolutionary new capabilities that can be applied to the SSA disability decision process include:

Natural Language (Processing (NLP)—which can help decision makers understand the complexities
of the mass of structured and unstructured data associated with disability claims

 Panels of responses—based on the relevant evidence gleaned from the relevant data within the vast troves of SSA data

IBM® Watson™ does not make decisions. Rather, it serves as an unbiased advisor to decision makers, using the power of cognitive computing to augment the decision makers' own capabilities. IBM® Watson™ is not a replacement for any system currently operating and generating data at SSA—it is a cognitive learning intelligence that can take the current information and bring together reference material, historical and predicted trends, and enable insights that are possible only from this revolutionary new technology. It can transform the disability determination process by helping SSA to make decisions more consistent, more accurate, and faster.

2 How WatsonTM can be Applied to SSA Disability Determination Operations

As SSA Deputy Commissioner, Bill Zielinski, noted in his testimony, SSA has much of which to be proud for the sheer volume of operations that it supports and the valuable assistance it provides to disabled Americans. The SSA disability determination process, however, remains complicated and time-consuming due to intricate eligibility rules, the inherent subjectivity of the evaluation, and other factors. In addition, processing disability claims can involve many layers of review with multiple hand-offs from one person to another, which make the disability programs costly to administer. Other major problems with SSA's current system for determining eligibility for disability benefits include:

- The length of time it takes to process a claim to completion
- The variability in decision outcomes among different state Disability Determination Services (DDSs), among different Office of Disability Adjudication and Review (ODAR) offices, and between DDSs and ODAR
- The high rate at which decisions are reversed on appeal [See *Improving the Social Security Disability Decision Process*, The National Academies Press, 2007. http://www.nap.edu/catalog.php?record id=11859]

These problems have resulted in high case backlogs, high case processing costs, and loss of confidence in SSA disability programs. The good news is that these problems can be solved. New and emerging technologies can extend the capabilities of Examiners and ALJs and the services they support.

IBM® Watson™ is a cognitive computing system that can be used in an advisory capacity to assist and support the SSA disability decision process. Cognitive computing systems learn and interact naturally with people to extend what either man or machine could do on their own. They help human experts make better decisions by penetrating the complexity of unstructured information and Big Data. IBM® Watson™, by ingesting a vast array of information—claim documents, determination process library, legal reference material, medical evidences, etc. can help reduce backlogs and accurately provide a confidence level with any decision made to approve, disapprove, or request more information at any point in the process. Additionally, data modeling can provide the disability decision makers at all levels with insights into best practices, and quickly identify decisions that are outside of the best practices.

This capability can use the existing systems already serving SSA, and not require replacement or redundancy; however, IBM[®] WatsonTM could help identify existing redundancy in systems or processes. A WatsonTM cognitive computing-based decision support system can provide the foundation for more consistent, accurate, and timely disability determinations.

Provide Recommendations to Users Based on Extensive Data

A Watson™ cognitive computing decision support systems uses Natural Language Processing (NLP) rapid analysis to interact naturally with SSA users and greatly expand the amount of information that a decision maker can take into consideration. It can help users make better informed decisions by harnessing the vast and complex data and information that is available within SSA, as well as from external sources. The structured data in SSA and external systems, plus the extensive unstructured data

within medical and other records submitted to SSA and other internal and external materials, can be assessed by SSA staff for decisions. A standard approach for considering the available information results in decisions that are more consistent across the locations and the individuals who are involved in making decisions.

Provide Alternatives and Confidence Ratings

A WatsonTM cognitive computing decision support system understands concepts by decomposing expressions of an idea through Natural Language Processing (NLP) and then combining the results with context and the probability that certain terms in the passage convey certain meanings. Human confidence is proportional to the evidence that supports decisions. Similarly, a WatsonTM system determines probabilities for disability decision points and uses reasoning algorithms to test hypotheses. It establishes a level of understanding and decomposes the decision against its probable intent. It can recompose the elements of the decision in various ways, each of which can be tested. The combinations can then be used to drive new discovery and insight, and to provide improved insight in future cases in ways that human never thought of. As illustrated in Figure 1, WatsonTM advisor evaluates evidence from multiple claims against the SSA legal reference library and suggests decisions with a confidence level associated with each decision.

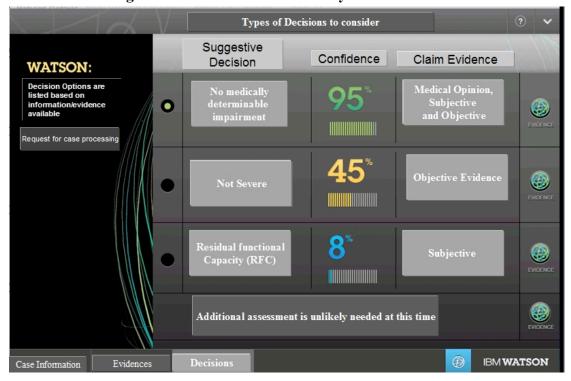


Figure 1: WatsonTM as a Disability Decision Advisor

Embed Continuous Improvement in the Process

A WatsonTM disability determination support system improves over time as it builds knowledge and learning, including disability terminology, processes, and its users' preferred methods of interacting. The system includes key disability domain expertise and adds to its knowledge base over time.

Reduce the Length of Time it Takes to Process an Application and the Backlog of Applications

WatsonTM can assist adjudicators to develop insights based on analysis of large sets of free text from medical records and other sources (for example applicant self-reported and claims data, disability literature, policy documents). These insights inform the disability evaluation and can be used to help the

decision maker determine pertinent case facts and findings and, ultimately, whether an application should be approved or denied. These insights can help SSA staff determine areas to focus on and what problems to focus on with an individual applicant. They provide suggestions about what alternative options to consider.

Standardize Outcomes

A WatsonTM decision support system can help reduce the variability in decision outcomes among different offices, or even different decision makers by using powerful NLP, machine learning, and analytic capabilities to help make case findings and to identify problems that should be addressed and resolved in making decisions. The user can identify and view the source data relied upon by the system to make recommendations. Adjudicators can thus determine the best course of action for a given applicant.

Reduce the Rate of Reversal on Appeal

Many unfavorable initial disability determinations are overturned on appeal and approved. The initial decision could be enhanced to improve accuracy by leveraging the capability to analyze an applicant's entire record for data and other information that is relevant to the case findings and conclusions, but may not have been fully considered by an earlier decision maker. The system determines the most important areas of focus for each case. Identifying, aggregating, and displaying pertinent data allows SSA staff to focus on the key evidence and information most relevant to the case.

Other Potential Benefits

A Watson[™] disability determination system can use powerful NLP, machine learning, and analytic capabilities to help with other important disability case processing goals. For example;

- Rapid access to and assimilation of complete case data leading to identification and analysis of
 patterns and circumstances that lead to divergent findings and conclusions and that contribute to
 divergent decisions at different levels of review.
- Prioritization and triage of applications to improve case processing efficiency. Quick Disability
 Determination and Compassionate Allowance are examples of ways to triage the incoming
 applications. A WatsonTM solution could expand the triage approaches to include identification of
 high potential for denial or potential problematic cases for alternative processing.
- More reliable methods for identifying applications that may be fraudulent, applicants who may benefit
 from return to work programs, and/or decisions that should be subject to quality review or other
 follow-up.
- Methods to identify potential improper payments, for example, by uncovering individuals or organizations that submit similar or identical medical reports or who are involved with unusually large numbers of allowance cases.

3 How Does IBM® WatsonTM Work?

IBM® Watson™ identifies patterns in diverse and complex information sources to gain critical insight and to enhance decision making. Watson™ is based on Deep Question-Answering (DeepQA) technology that understands natural human language. It can analyze an almost limitless range of topics and make informed judgments about those topics by understanding vast amounts of structured and unstructured data. For healthcare providers, Watson™ can provide critical and timely information



to help medical staff diagnose and treat patients. The same DeepQA technology can be applied to provide critical and timely information to help SSA staff make decisions in the disability determination process.

WatsonTM analyzes a "corpus" or body of data that consists of unstructured information such as text

books, guidelines, how-to manuals, FAQs, benefit plans, electronic health records, and news. WatsonTM ingests the entire corpus to curate content into a form that can be analyzed very rapidly. It focuses on whether the corpus content is appropriate, and sifts out information that is out of date, irrelevant, or derived from potentially unreliable sources.

WatsonTM answers questions by decomposing the question, determining potential responses in the corpus, and then examining the responses in hundreds of ways. It determines a degree of confidence in its interpretation of the question and potential answers. Figure 2 illustrates the process that WatsonTM uses to respond to a question.

Cognitive Computing

A WatsonTM cognitive computing system mimics how humans reason and process information. Unlike traditional computers programmed to calculate rapidly and perform deterministic tasks, it can analyze information and then draw insights from that analysis by using probabilistic analytics. It learns from its own interactions with data, in effect continuously reprogramming itself.

WatsonTM can transform how organizations think, act, and operate by:

- Using NLP to assess and evaluate language over unlimited topics and then making informed judgments
- Combining natural language processing, hypothesis generation and evaluation, and dynamic learning for a powerful, fast, and accurate solution
- Understanding complex unstructured data
- Applying advanced analytics to weigh and evaluate responses
- Learning based on outcomes to get smarter with each iteration and interaction

Natural Language Processing

Traditionally, digitized information has been structured and stored in tables or searchable and accessible cells in databases. In addition to this structured data, 80% of the world's data today is unstructured. Within healthcare, some of the most valuable information in Electronic Medical Records (EMRs) is captured in clinicians' notes. NLP allows for querying this text-based information from medical records, policy documents, and any other relevant text.

Data Corpus

It can take a long time for humans involved in disability determinations to read and synthesize case materials to make findings, conclusions, and a decision on an application. Analyzing the complete corpus empowered by WatsonTM cognitive computing technology can reduce the time it takes to review a case by providing relevant and up—to-date insight gleaned from analyzing the corpus.

Iterative Internal Ouestions and Answers to Refine Results

WatsonTM cognitive computing allows an iterative question and answer loop to provide more refined information with each iteration. This iterative process refines the system's confidence in a particular set of answers or suggestions for future queries.

Machine Learning

WatsonTM machine learning allows the system to learn from the feedback from its users. It adapts quickly to the insight from users about the specific populations they serve and continuously improve the responses that provides.

WatsonTM Technology to Improve SSA Disability Process

WatsonTM has transformational technologies for deep unstructured question and answer analysis, content analysis, and evidence-based reasoning that elevate the power of structured data analytics. NLP and machine learning can leverage SSA's unstructured disability claims and beneficiary information, as well as information from external sources.

Queries and systematic analysis can assess unstructured data such as medical and expert notes, journal articles, and disability literature. A specific WatsonTM solution for SSA can be designed to handle questions that produce a small set of prioritized answers—for example, concerning a beneficiary's disability circumstances—that can be explored to further understand the extent of disability and the evidence that supports it. SSA



SSA & IBM: 75 Years of Innovations

- 1930s IBM Type 77 Collators
- 1950s IBM 604 Electronic Calculator
- 1990s IBM AS400/Content Manager
- 2000s Quick Disability Determination (QDD) and Compassionate Allowances (CAL) projects

Benefit to SSA: IBM provides leading edge technologies help SSA meet operational goals

staff use their judgment to evaluate the responses provided by the WatsonTM system. Analysis of large volumes of unstructured text to support the decision making process can potentially reduce the time required to make decisions and improve the consistency of the decisions.

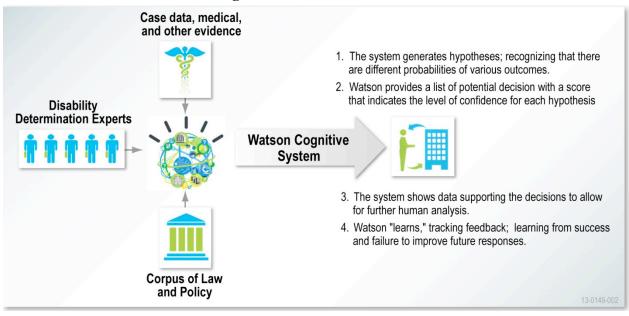
The *Watson*TM *overview* in Figure 3 suggests the WatsonTM advisor interaction with many business users and interface with existing applications and services, and is envisioned to provide its own services for other applications. Sources of internal SSA and external information that could be included in a disability determination solution are listed in Table 1.

IBM WatsonTM has advanced unstructured data analytics, NLP, and work-load optimization. These capabilities can be applied to answer disability determination queries based on the specific case facts along with a body of knowledge in the corpus. WatsonTM can learn from past cases and guidelines and develop increasingly sophisticated expertise in disability determinations. Understanding the meaning and context of human language and rapidly processing information to find precise answers to complex questions can transform how computers support SSA programs.

Table 1: Structured and Unstructured Information for Watson™ Analysis

Disability Determination Reference Materials	Disability Determination Case Materials
Regulation Basis Code (RBC)	Disability Case Processing System (DCPS) data
Applicable Law and Regulations	DDS Case Processing Data (Iron Data and MIDAS)
Social Security Rulings	eCAT data
Listing of Impairments	Applicant background data (e.g., age, employment history, marital status, financial resources)
Applicable case law	Applicant disability data (e.g., impairments, treatment, tests, limitations)
SSA operating instructions and procedures	Applicant work history, education, and training
Medical Dictionaries	Other information related to the alleged disability
Disability Dictionaries	Other disability benefits
Historical Case Data	Medical records, exams, test results
	Case notes

Figure 3: WatsonTM Overview



4 Examples of WatsonTM in Healthcare

Healthcare has been one of the focus industries for the initial WatsonTM solutions. Since its introduction, WatsonTM has become 240% faster and 75% smaller. WatsonTM can now run on a single server, which is the size of four stacked pizza boxes, onsite or through the cloud. There are many use cases for using WatsonTM cognitive computing to improve healthcare research and delivery. Some early implementations of WatsonTM in healthcare are the WellPoint utilization management solution, the Memorial Sloan-Kettering cancer diagnosis system, and systems at the Cleveland Clinic, and the MD Anderson Cancer Clinic.



WellPoint Utilization Management

IBM worked with WellPoint to develop a new approach to utilization management (UM): using the cognitive system IBM® Watson™ to provide approval suggestions to nursing staff based on clinical and patient data. WellPoint trained Watson™ with 18,000 historical cases. The UM system uses hypothesis generation and evidence-based learning to generate confidence-scored recommendations that help nurses make decisions.

The project started with a pilot in which WellPoint used WatsonTM for 1,500 real-life cases, with very favorable results. Less than 1 year after beginning the pilot, the system went into production at five provider offices. "The power of WatsonTM to bring information and data together, [and] make it relevant where decisions are being made, turns it into knowledge at the point where it can make a difference," says Lori Beer, WellPoint executive vice president.

Benefits that WellPoint has realized include:

- Nurses make faster UM decisions about treatment requests
- Accelerate healthcare preapprovals, which can be critical when treatments are time-sensitive
- Incorporate more information (unstructured data) in the streamlined decision process

Memorial Sloan-Kettering Cancer Center

Memorial Sloan-Kettering Cancer Center (MSKCC) worked with IBM® to develop a solution for cancer

diagnosis. Beginning with breast and lung cancers, the solution consolidates clinical expertise, molecular and genomic data, and a vast repository of cancer case histories. "Watson's capability to analyze huge volumes of data and reduce it down to critical decision points is absolutely essential to improve our ability to deliver effective therapies and disseminate them to the world," says Dr. Craig Thompson, president and CEO of MSKCC.

The solution includes supporting evidence with every suggestion, both to provide transparency and to aid in the doctor's decision-making process. WatsonTM points out areas in which more information is needed and updates its suggestions as new data is added. Ultimately, WatsonTM is expected to facilitate access to the best of oncology's collective wisdom. "What WatsonTM is going to enable us to do is take that wisdom and put it in a way that people who don't have that much experience in any individual disease can have a wise counselor at their side at all times and use the intelligence and wisdom of the most experienced people to help guide decisions," says Dr. Larry Norton, deputy physician-in-chief for breast cancer programs and medical director for MSKCC.

Benefits that Memorial Sloan-Kettering has achieved include:

- Support for evidence-based suggestions for oncologists' decisions
- Incorporates patient data and massive volumes of medical literature, including journal articles, physicians' notes, and NCCN guidelines and best practices to provide recommendations
- Continued improvement as new oncology techniques, treatments and evidence are developed

Cleveland Clinic Lerner College of Medicine of Case Western Reserve University

After a year-long research collaboration with faculty, physicians and students at Cleveland Clinic Lerner College of Medicine of Case Western Reserve University, IBM Research has unveiled two cognitive computing technologies that can be used by Watson, and are expected to help physicians make more informed and accurate decisions faster and to cull new insights from electronic medical records (EMR). The projects known as "WatsonPaths" and "WatsonTM EMR Assistant" will create technologies that can be used by WatsonTM in the domain of medicine.

With the WatsonPaths project, IBM scientists have trained the system to interact with medical domain experts in a way that's more natural for them, enabling the user to more easily understand the structured and unstructured data sources the system consulted and the path it took in offering an option. The WatsonTM EMR Assistant project aims to enable physicians to uncover key information from patients' medical records, to help improve the quality and efficiency of care.

"Through our research collaboration with Cleveland Clinic, we've been able to significantly advance technologies that WatsonTM can leverage to handle more and more complex problems in real time and partner with medical experts in a much more intuitive fashion. These are breakthrough technologies intended to assist future versions of WatsonTM products." said Eric Brown, IBM Research Director of WatsonTM Technologies.

University of Texas MD Anderson Cancer Clinic

The MD Anderson Cancer Clinic uses the IBM Watson™ cognitive computing system for its mission to eradicate cancer. Following a yearlong collaboration, IBM and MD Anderson will showcase a prototype of MD Anderson's Oncology Expert AdvisorTM powered by IBM Watson. Watson's cognitive computing power is being leveraged to help patients by enabling clinicians to uncover valuable insights from the cancer center's rich patient and research databases.



Innovations

http://www.youtube.com/watch?

The link below illustrates the IBM

Watson™ and WellPoint:

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MD Anderson's Oncology Expert Advisor powered by IBM® WatsonTM is designed to integrate the

knowledge of MD Anderson's clinicians and researchers, and to advance the cancer center's goal of treating patients with the most effective, safe, and evidence-based standard of care available. Starting with the fight against Leukemia, MD Anderson's Oncology Expert Advisor is expected to help MD Anderson clinicians develop, observe, and fine-tune treatment plans for patients, while helping them recognize adverse events that may occur throughout the care continuum. The cognitive-powered technology is expected to help researchers advance novel discoveries.

MD Anderson's Oncology Expert Advisor is accessible to the cancer center's network of clinicians through a computer interface or supported mobile devices. This provides clinicians—and in turn, patients—with immediate, worldwide access to MD Anderson's expertise and resources, and to IBM Watson's technology prowess in quickly extracting crucial insights from large volumes of complex data.

5. Summary

IBM is leading the Cognitive Systems Era. We are transforming how organizations use information and make decisions.

WatsonTM technology can be applied to the SSA disability determination process to provide a "trusted advisor" to those who make disability decisions. WatsonTM provides not only recommendations but information that supports those recommendations. Each recommendation is scored based on relevance. The individual using WatsonTM evaluates the information presented and ultimately decides whether to use some, all, or even none of that intelligence. WatsonTM makes data fully transparent so users can examine the sources of recommendations if the wish. While users are not obligated to use and act on the intelligence generated by Watson, they can incorporate the results into the decision-making process, balancing and/or augmenting their own existing knowledge and expertise.

WatsonTM can benefit SSA and its decision makers in myriad ways. WatsonTM can improve decisions by enabling increasing levels of insight at each step of the disability decision-making and review processes and SSA can use WatsonTM to provide more consistent, accurate, and timely disability determinations. WatsonTM is designed to augment human intelligence; not replace it. These capabilities can support the Social Security Administration disability determination process by:

- 1. Reducing case processing time and costs by helping decision makers take control of the vast quantities of information and data that needs to be reviewed and analyzed
- 2. Reducing the variability in decision outcomes among different state Disability Determination Services (DDSs), among different ODAR offices, and between DDSs and ODAR by providing a rigorous, consistent framework for case adjudication
- 3. Reducing the high rate at which decisions are appealed and reversed on appeal by improving the decision quality at the initial determination step and providing a higher confidence level in case outcomes

As a result, SSA can expect significant cost savings, reduced case backlogs, greater decision consistency, more transparency, and greater accountability throughout the agency.

After working together for almost 8 decades, and reviewing the new SSA Strategic Plan released in March 2014, IBM recommends cognitive computing technology as a critical enabler to transform the Disability Determination program and IBM recommends creating an enterprise-wide Virtual Center for Program Integrity (VCPI) that has six technology sectors solely focused on countering fraud. These VCPI technology sectors are interchangeable and will stay current as the technology evolution continues and provides significant cost efficiency over time.